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ABSTRACT

Research is examined on learning and memory from text across the adult life span. The outcomes of the extant studies are contradictory. Clarification of these confusing findings is obtained by examining variations in the learner variables of education level and performance on vocabulary tests. Problems are considered in equating the learner characteristics for cross-sectional samples of young and old adults. Meyer and Rice collected data on a sample of more than 400 adults. Four samples of 100 young and old adults were selected from this original sample in order to make different education and vocabulary comparisons. These samples were selected to parallel these learner characteristics in past prose learning studies with young and old adults. Findings from these comparisons show that age deficits in prose learning occur for older adults with average and low average verbal ability. However, the magnitude of these deficits decreases with increased verbal ability. In fact, depending on how investigators equate age groups on education and verbal ability, they can eliminate or produce aging deficits with these more highly verbal and educated adults. Further research in this area should specify the learner variables of age, education, and vocabulary (with comparably scaled tests) as well as text and task variables. (Author)

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LEARNING AND MEMORY FROM TEXT ACROSS THE ADULT LIFE SPAN

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LEARNING AND MEMORY FROM TEXT ACROSS THE ADULT LIFE SPAN

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Abstract

Research is examined on learning and memory from text across the adult life span. The outcomes of the extant studies are contradictory. Clarification of these confusing findings is obtained by examining variations in the learner variables of education level and performance on vocabulary tests. Problems are considered in equating these learner characteristics for cross-sectional samples of young and old adults. Meyer and Rice collected data on a sample of over 400 adults. Four samples of 100 young and old adults were selected from this original sample in order to make different education and vocabulary comparisons. These samples were selected to parallel these learner characteristics in past prose learning studies with young and old adults. Findings from these comparisons show that age deficits in prose learning occur for older adults with average and low average verbal ability. However, the magnitude of these deficits decreases with increased verbal ability. In fact, depending on how investigators equate age groups on education and verbal ability, they can eliminate or produce aging deficits with these more highly verbal and educated adults. Further research in this area should specify the learner variables of age, education, and vocabulary (with comparably scaled tests) as well as text and task variables.

Learning and Memory from Text Across the Adult Life Span

Few studies have examined adult age difference in learning and memory of prose materials. Until recently, most of the research examining the development of adult learning and memory has investigated the learning of lists of words, letters, and pairs of words (Canestrari, 1968; Denney, 1974; Hultsch, 1971, 1974; Taub, 1974). This research has consistently demonstrated age-related deficits (Craik, 1977). While this research has contributed to our understanding of adult cognition, recently cognitive psychologists have sought to examine learning and memory with more meaningful and naturalistic prose materials (Hartley, Harker, & Walsh, 1980; Hultsch & Pentz, 1980; Taub, 1980).

Prose Learning Studies

The earliest prose learning studies found age-related deficits. Schneider, Gritz, and Jarvik (1975) examined verbatim recall of a short story presented auditorially; they found an age-related decrement for immediate recall, but no age decrement on a delayed recall test given one week later. Further prose learning studies utilized substantive free recall or recognition tasks rather than verbatim recall.

Taub (1975, 1976, 1979; Taub & Kline, 1978), examining both age and presentation mode, found age-related differences in prose recall with visual presentation being superior over auditory for both young and old adults. However, Taub (1979) showed that age-related deficits on multiple-choice questions administered after reading passages were found for older adults with low average to average range vocabulary scores on the Wechsler Adult Intelligence Scale (WAIS), but not for the higher scoring bright average adults (see Table 1).

Hultsch, Simon, and Dixon (Note 1) also examined age and modality of presenting prose. Like Taub, they found superiority for all age groups in reading versus listening to text. However, Hultsch et al. found that younger subjects benefited more from the opportunity to read than the old adults. Hultsch et al. found age deficits in total recall of news articles and recall of their gist. The older adults in this study had relatively low levels of education and vocabulary scores (see Table 1) and blue-collar job experiences. The young adults had comparable levels of education and vocabulary scores, but 80% were currently enrolled in school. None of the old adults were students.

Gordon and Clark (1974) and Cohen (1979) examined aging effects with high verbal adults (see Table 1) and passages modeled after Dawes' (1966) Circle Island passage; these passages contain ten logical set relationships between five groups of people. Gordon and Clark, with visual presentation and oral recall, found age deficits on immediate free recall and recognition tests and particularly after one week delayed tests. Cohen (1979) found deficits in older subjects on their immediate oral recall of the auditorially presented (120 words/minute) Circle Island passage. Also, the older subjects were less likely to recall the gist information than young adults, and were lower in their recall of modifiers (included comparatives, quantifiers, temporal modifiers, locatives, and logical connectives).

Zelenski, Gilewski, and Thompson (1980) also reported age deficits in prose learning. However, as can be noted in Table 1, their old adult group had considerably lower education and vocabulary levels than their young adults.

On the other hand, several recent investigations with prose and highly educated older adults have not found age deficits. Meyer and Rice (1981), using Arizona State University alumni with WAIS vocabulary scores equivalent to Taub's (1979) high group (see Table 1), found no age deficits in total recall nor recall of the gist. Harker, Kent, Hartley, Finkle, and Walsh (Note 2) found no age deficits when comparing the prose learning of an old group comprised of alumni of the University of Southern California with a young group of USC undergraduates nor with a young group of USC graduate students. In addition, Cavanaugh and Perlmutter (Note 3) found no age deficits in memory for discourse presented on television; their old adults were University of Minnesota alumni.

Variables Responsible for Diversity of Findings

In summary, the results from the study of age differences in prose recall are contradictory and confusing. In addition to opposing results, the types of descriptive measures on the subjects and types of tasks differ. Figure 1 (after Brown, Campione, & Day, 1981; Meyer, 1981) depicts three major types of variables and their potential interactions which may be responsible for the diversity of findings in this research area. The variables listed within each of the three learner, text, and task variables interact as well as the interaction among the three types of variables. For example, signaling (explicit emphasis cues, Meyer, 1975) interacts with text structure (Meyer, 1981); the magnitude of its assistance to a learner depends on the way in which the text is organized and the level in the text structure being signaled. In addition, these two text variables interact with the reading comprehension skills of the learner (Meyer, 1981;

Meyer, Brandt, & Bluth, 1980; Meyer & Rice, Note 4). The line between the learner variables and task variables also represents numerous interactions, such as differential task familiarity or the interaction between presentation mode and age shown by Hultsch et al. (Note 1).

Verbal Ability and Education

For this paper, I will ignore the text and task variables and concentrate on the learner variables of formal education, verbal ability (as quantified with vocabulary scores), and age. Table 1 lists the outcomes of the major prose learning studies and describes the education and vocabulary levels of the young and old adults. In considering the learner variables of education and vocabulary as partially responsible for the contradictory aging effects in prose learning, I am considering the long-standing problem in aging research of how to make old and younger age groups equivalent on cultural variables in cross-sectional studies (Birren & Morrison, 1961; Botwinick, 1978; Krauss, 1980).

Education. Krauss mentions ". . . if the research question is directed toward comparisons of young and old individuals having particular educational attainments, such as high school graduates, university faculty, and so on, there should be no problems in interpreting the data." However, he points to difficulties with this approach: generalization limitations and equivalency problems. If studies examine only old adults with college degrees, their findings may not hold for the majority of old adults who lack these degrees. In addition, degrees from various institutions and generations differ in educational attainment. Also, the fact that fewer older adults were highly educated reflects economic differences and changes

in accessibility to education over the last half century rather than differences in aptitude for academic achievement.

Vocabulary. The issue of getting equivalent cross-sectional samples on verbal ability is quite complex. There are at least four aspects of this problem which contribute to its complexity. First, vocabulary test scores improve with age, particularly from the ages of 18 to 25 (Wechsler, 1955). Thus, if you select a young group of college freshmen to match the vocabulary performance of an older group, you may be comparing your old group to a group of young adults with superior verbal aptitude although equivalent current performance. This could be the case in the Hultsch et al. (Note 1) study where college freshmen and sophomores are compared to older adults. (However, in this study, the young adults score slightly lower on the ETS vocabulary test.) Another similar issue is that adult vocabulary scores appear to decline somewhat at the oldest age levels (Botwinick, 1978).

Another problem is declining standardized test scores of the young. A common difficulty in conducting aging research is even being able to locate young adults in university programs with vocabulary scores as high as alumni from the same school who are in the older age groups (i.e., see Harker et al. in Table 1). It is possible that verbal aptitude, particularly those traits necessary for reading comprehension, is equivalent for an undergraduate young group and alumni old group with unequal vocabulary scores (refer to the Harker et al. samples in Table 1).

The final problem relates to what test the experimenter selects to employ. As noted in Table 1, a variety of vocabulary tests have been

employed; little is known about how they compare with samples of young and older adults.

In a series of studies with 434 young, middle, and old adults, Meyer and Rice (Note 4) gave subjects the Quick Word Test (Borgatta & Corsini, 1964), a 100-item power vocabulary test. Forty old adults and 26 young adults returned to take the Vocabulary Subtest of the WAIS. The correlations between the Quick Word Test and the WAIS Vocabulary Subtest were .83 for the young adults and also for the old adults; Figure 2 displays the regression lines for the young and old samples. The Quick Word Test is better for discriminating among people at the higher verbal ability levels. The Shippley-Hartford Test (1940) used by Harker et al. (Note 2) also discriminates better at the high levels. Also, as can be seen in Figure 2, the older adults score higher on the Quick than young adults with equivalent WAIS scores, particularly at the higher verbal ability levels.

These findings are illuminating when applied to the data in Table 1. For example, take Taub's (1979) data and predict mean Quick scores for his high, middle, and low vocabulary groups. The difference between the predicted Quick scores for young (42.5) and old (52.5) adults in the first study with no aging deficits is 10 points, while the difference is five for the lower vocabulary adults in the two studies where aging deficits were found. Small nonsignificant differences in WAIS vocabulary scores for the higher verbal groups appear to hide significantly different vocabulary performance on tests allowing for greater differentiation at higher levels. The studies in Table 1 which did not find aging

effects may result from comparing old adults who are currently more verbal to less verbal younger adults.

Different Samples: Different Aging Effects

This section of the paper attempts to further investigate with some recently collected data the learner variables of education and vocabulary and their relation to age deficits in prose learning. These data were collected on 148 young adults and 166 old adults in a series of related studies (Meyer & Rice, Note 4); the young adults fell within the age range of 18 to 32 and the old adults were 65 or older. Most of the subjects responded to a call for subjects given in a feature article about aging and prose learning which appeared in the Sunday issue of the Phoenix paper; the volunteers were paid $4 per hour for their participation. The education level and performance on the Quick Word Test for the subjects are summarized in Table 2. (Another group of 120 middle age adults also were run in these studies.) As seen in Table 2, vocabulary scores on the Quick Word Test predict recall scores better for the old group (31% of the variance) than the young group (18% of the variance). Also, it is of interest to note that recall does not relate to age for the old adults.

Four samples of 100 young and old adults (50 per age group) were selected from the original sample in order to make various education and vocabulary comparisons. These samples were selected to parallel the learner characteristics of subjects in the prose learning studies which are listed in Table 1.

All of the subjects read and recalled two 388-word expository passages: one on the topic of supertankers with a problem-solution top-level structure (Meyer, Brandt, & Bluth, 1980) and the other on the topic of railroads

with a comparison top-level structure and historical time line. They each contained 244 scorable idea units comprised of the text's concepts and interrelationships among these concepts. In addition to scoring for total number of idea units remembered immediately after reading each passage, the number of major logical relationships recalled (14 per passage) and minor details (28 names, numbers, dates, and their relations per passage) recalled by each subject were scored. Reliability in scoring between independent scorers was over .95. The subjects read and recalled the passages at their own rate; they utilized digital timers to record their reading and writing times.

Random young vs. high verbal old. The first of the four samples was comprised of a random sample of 50 of the young adults from the original study and the 50 old adults who scored highest on the Quick Word Test. Table 3 presents the mean education and vocabulary scores for the two age groups. The education level of the young and old groups is not significantly different. Their education level parallels those prose learning studies listed in Table 1 which used college alumni (Meyer & Rice, 1981; Harker et al., Note 2; Cavanaugh & Perlmutter, Note 3). The vocabulary scores of the young and old group in this sample are very different (28-point difference in means on the Quick and a predicted 10-point difference on the WAIS).

For this sample, there were no age differences in total recall; the mean for the young adults was 86.28 and it was 90.51 for the old adults ($F_{1, 98} = .62$). In addition, the age groups did not differ in reading times ($\bar{X}_{young} = 181.4$ seconds, $\bar{X}_{old} = 199.0$ seconds, $F_{1, 96} = .027$). An analysis was run on proportion of the major 14 logical relationships

recalled in comparison to the proportion of the 28 minor details recalled. There were no age effects in recall of logical relations and details ($F_{1, 98} = 1.91$). The relations were recalled better than the details ($F_{1, 98} = 33.1$, $p < .00001$), and there was no type of information by age interaction ($F_{1, 98} = .64$).

Thus, in this comparison of young and old adults, no aging deficits were found on any measures. These findings and the education level of the subjects are equivalent to the findings of Meyer and Rice (1981); Harker et al., (Note 2); and Cavanaugh and Perlmutter (Note 3). Also similar is the Taub (1979) study with high vocabulary old adults.

To summarize, when comparing college educated young and old adults where the old adults have superior verbal abilities, there are no aging deficits. The fact that the young and old adults in this sample are equivalent in education brings us back to the point of Krauss (1980) that college educated old adults are quite possibly a more selective group than the college educated young adults in the current decade.

High verbal young vs. high verbal old. The next comparison examines differences in recall between the highest scoring young adults from the larger sample on the Quick Word Test and the highest scoring old adults. As can be seen from Table 3, these two groups are equivalent in education, but differ significantly on the Quick Word Test. It is interesting to note that predicted means for the Vocabulary Subtest of the WAIS only differ by one point; the predicted mean WAIS score for the young adults from the regression line shown in Figure 2 is 71, while the predicted mean for the old adults is 72. Thus, these young and old adults would have

extremely high WAIS vocabulary scores and look similar to the samples used by Gordon and Clark (1974) and Cohen (1979) (see Table 1).

For this sample of high verbal young and old adults, there were age differences in total recall, but not of recall of logical relationships nor details (see Table 3). The mean total recall for the young adults was 102.49, while it was 90.51 for the old adults ($F_{1, 98} = 4.9$, $p < .03$). The age effect was not statistically significant on recall of major logical relations and details ($F_{1, 98} = 2.14$). The relations were recalled better than the details ($F_{1, 98} = 32.73$, $p < .00001$), and there was no type of information x age interaction ($F_{1, 98} = .23$). The mean proportion of logical relationships recalled by the young adults was .48 and the mean for the old adults was .45.

In summary, age deficits in total recall were found with this sample of highly educated and highly verbal adults. The recall findings and learner characteristics of this sample are equivalent to the studies of Gordon and Clark (1974) and Cohen (1979). However, Cohen (1979) also found an age deficit in recall of modifiers, a category which included logical relations. No age deficits in recall of the major logical relationships were found. Differences between this finding and the results of Cohen may be due different types of relations scored, differential cueing of these relations in the text, or different kinds of relations (i.e., set relations versus causal relations) in the different text materials.

In contrast to the first of the four comparisons (young random vs. high verbal old), this comparison shows equivalency on predicted WAIS vocabulary scores, a one-point instead of a 10-point predicted superiority

in vocabulary for the old adults (see Table 3). In this respect, the Taub (1979--high verbal sample) and Meyer and Rice (1981) studies are similar to this second comparison (high verbal young vs. high verbal old). However, age deficits were found in total recall for this comparison while they were not found in the other studies. It is possible that the smaller number of subjects in the other two studies contributed to non-significant findings (50 subjects per age group versus 16 per age group for Meyer and Rice and 9 per age group for Taub). In both studies the means were slightly less for the old adults (the variance is greater for prose recall studies than word list studies).

Low verbal young vs. low verbal old. The third comparison looks at differences between the 50 lowest scoring young adults on the Quick Word Test and the 50 lowest scoring old adults on this test. As shown in Table 3, this sample is equivalent in education; the adults have little post high school education in comparison with the prior two comparisons comprised primarily of college alumni. The groups differ on vocabulary scores with the old adults scoring significantly higher (see Table 3).

As shown in Table 3, there are age deficits in total recall scores and recall of logical relations for this sample of low verbal young and old adults. The mean total recall score for the young adults was 75.53, while it was 60.64 for the old adults ($F_{1, 98} = 9.97$, $p < .002$). Also, the age effect on recall of logical relations and details was significant; the mean proportion of logical relations recalled was .36 and .31 and the mean proportion of details recalled was .28 and .21 for the young and old age groups, respectively. These superordinate logical relations were recalled significantly better than the details ($F_{1, 98} = 26.05$, $p < .00001$), and there was no type of information by age interaction ($F_{1, 98} = .05$).

Thus, age deficits in prose learning were found with adults who possessed average verbal skills and about 13 years of education. Even though the old adults in this sample had superior scores on the vocabulary test, there are substantial differences in prose recall. The learner characteristics of this sample and the recall outcomes are parallel to the studies of Hultsch et al. (Note 1) and Taub (1979) with adults of average to low average vocabulary scores and 12 to 13 years of education.

Low verbal old vs. matching young. The final grouping compares the 50 lowest scoring old adults on the Quick Word Test to a group of young adults with comparable scores on this test. As seen in Table 3, comparable Quick scores result in poorer predicted WAIS vocabulary scores for the old adults than the young adults. Also, the groups differ significantly on education level. The Zelinski et al. (1980; Zelinski, Note 5) study compared groups with similar learner characteristics (see Table 1).

For this final comparison large age deficits were found for total recall scores and recall of logical relationships. The mean total recall score for the young adults was 92.36, while it was 60.64 for the old adults ($F_{1, 98} = 42.5$, $p < .00001$). An age deficit also was found in recall of logical relations ($\bar{X}_{young} = .41$, $\bar{X}_{old} = .31$) and recall of details ($\bar{X}_{young} = .36$, $\bar{X}_{old} = .21$) ($F_{1, 98} = 21.91$, $p < .0001$). Logical relations were recalled better than details ($F_{1, 98} = 15$, $p < .0002$). There was no type of information by age interaction ($F_{1, 98} = 1.45$).

Although the Quick Word Test scores for this comparison grouping are equivalent, the predicted WAIS vocabulary scores are lower for the old age group than the young group. In addition, as seen in Table 3, the old adults have had substantially fewer years of education. These learner

characteristics are similar to those in the Zelinski et al. (1980, and personal communication) study where large age deficits in prose recall also were found.

Discussion

From these analyses of different age group samples and their correspondence to prior studies, it is evident that there are age deficits in prose learning for older adults with average or below verbal abilities and little post high school education. As can be seen in Table 3, comparisons of young and old adults within this vocabulary and education range yield large age deficits in recall. They occur when comparing young and adults with equivalent vocabulary scores, old adults with higher vocabulary scores than young adults, and vice versa.

The situation is not as clear for old adults with higher verbal ability and college educations. Figure 3 depicts the hypothesized relationship, between the magnitude of aging deficits and the amount of education and verbal ability of old adults. The findings from the two comparisons with high verbal old adults listed in the top half of Table 3 indicate that verbal ability differences between the young and old groups are an important factor in predicting age deficits. Both the random young versus the high verbal old comparison group and the high verbal young and old comparison group were equivalent on education; however, the vocabulary differences were greater for the first comparison where no deficits in recall were found than for the latter comparison where predicted WAIS vocabulary scores were equivalent, but moderate age deficits in recall appeared. Vocabulary appears to relate more closely to recall than education for the old adults. For the 166 old adults in the original sample education and vocabulary

scores were not related (r_{xy} = .02), while for the 148 young adults they were related (r_{xy} = .56).

By disregarding the problems previously discussed concerning vocabulary and taking the scores at face value, we could take the position that age deficits also occur in prose learning for high verbal adults. We could discount the comparison and research studies listed in Tables 1 and 3 which did not find age deficits as non-equivalent cross-sectional age samples. That is, although the college educated adults are equivalent in education, this education level represents a more selective and higher verbal group for the old adults than for the young adults. Instead, more appropriate cross-sectional samples are represented by the findings from the high verbal young and old group comparison (equivalent and high predicted WAIS scores) (Cohen, 1979; Gordon & Clark, 1974).

However, the reverse position could be taken when considering some of the problems in getting equivalent cross-sectional age samples on vocabulary. The increase in vocabulary scores with age until about 70 years of age coupled with declining test scores for young adults could argue for comparing old adults with young adults who score lower on vocabulary tests. That is, we would assume that the vocabulary scores of the young adults would increase with age, and that less emphasis was placed on word knowledge with the current generation of young adults than the old, but that verbal aptitude has not changed. In this case, we would disregard the studies which found age deficits with high verbal young and old adults with equivalent vocabulary test scores. For example, in the Gordon and Clark (1974) study (see Table 1), the young adults were all graduate students at Columbia University, while the old adults were members

of the Institute for Retired Professionals in New York City. Both the education level and WAIS vocabulary scores of the young group would be expected to rise and exceed those of the old adult sample by the time the young adults reached 65 years of age. Thus, from this perspective, better comparison groups for age differences would be the ones listed in Tables 1 and 3 where there were no age deficits.

In conclusion, age deficits in prose learning appear to occur for older adults with average and low average verbal ability. However, the magnitude of these deficits decreases with increased verbal ability. In fact, depending on how an investigator equates age groups on education and verbal ability, s/he can eliminate or produce aging deficits with these more highly verbal and educated adults. In addition, the text and task variables listed in Figure 1 probably interact with these learner variables to yield age deficits with certain texts and tasks, but not with others.

Further research in this area will need to specify the learner variables of age, education, and vocabulary as well as text and task variables. In addition, it would be helpful if vocabulary tests were administered with comparable scales.

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Table 1

Analysis of Outcomes and Learner Variables for the Major Extant Prose Learning Studies with Young (Y) and Old (O) Adults

Investigations	Age Deficits?	Learner Variables	
		Education	Vocabulary
Taub (1979)	No	Y = 14,[a] O = 13.4	Y = 57, O = 58--WAIS
Taub (1979)	Yes	Y = 12.4, O = 13.1	Y = 51, O = 50--WAIS
Taub (1979)	Yes	Y = 12.1, O = 12.4	Y = 38, O = 40--WAIS
Hultsch, Simon, & Dixon (Note 1)	Yes	Y = 13, O = 12.8	Y = 14, O = 16--ETS V-1
Gordon & Clark (1974)	Yes	Y = 16.6, O = 16.7	Y = 74, O = 73--WAIS
Cohen (1979)	Yes	Y = students, graduate students (Oxford) O = university education or professional training	Y = 69, O = 69--WAIS
Zelinski, Gilewski, & Thompson (1980, Note 5)	Yes	Y = 15.7, O = 11.9	Y = 44, O = 36 (Itemson Test = 50)
Meyer & Rice (1980)	No	Y = 15.3, O = 15.4	Y = 56, O = 58--WAIS
Harker, Kent, Hartley, Finkle, & Walsh (Note 2)	No	Y I = USC undergrads. Y II = USC grad. students O = USC alumni	Y I = 31 Y II = 35 O = 37 Shipley-Hartford (1940)
Cavanaugh & Perlmutter (Note 3)	No	Y = 14.1 U of M students O = 16.2 U of M alumni	None

[a]Means for each age group.

Table 2

Descriptions of Total Sample of Young and Old Adults

Age Group	Education	Vocabulary (Quick)	Correlations: Vocabulary with Recall	Correlations: Age in Years with Recall
Young	$\overline{X}$ = 14.95 SD = 2.4	$\overline{X}$ = 48.96 SD = 17.13 (predicted WAIS $\overline{X}$ = 60)	.43	-.09
Old	$\overline{X}$ = 14.15 SD = 3.1	$\overline{X}$ = 63.45 SD = 18.2 (predicted WAIS $\overline{X}$ = 64)	.56	-.02

Table 3

Four Comparisons of Different Young (Y) and Old (O) Age Groups: Learner Variables, Recall Outcomes, and Correspondence with Prior Prose Learning Studies

Four Comparison Groups	Learner Variables		Age Deficits?		Parallel Prior Studies
	Education	Vocabulary (Quick)	Total Recall	Logical Relations	
Random Young vs High Verbal Old	Y = 15.4, O = 16.1 ($F_{1, 98}$=2.2, n.s.)	Y = 52, O = 80 ($F_{1, 98}$=121.03, p<.0001) Predicted WAIS: Y = 62, O = 72	No Y = .35, O = .37[a] ($F_{1, 98}$=.62)	No Y = .40, O = .45 ($F_{1, 98}$=1.91)	Cavanaugh & Perlmutter (Note 3) Harker et al. (Note 2) Meyer & Rice (1981) Taub (1979)-- High Verbal
High Verbal Young vs High Verbal Old	Y = 16.5, O = 16.1 ($F_{1, 98}$=.83, n.s.)	Y = 67, O = 80 ($F_{1, 98}$=60.03, p<.0001) Predicted WAIS: Y = 71, O = 72	Yes Y = .42, O = .37 ($F_{1, 98}$=4.9, p<.03)	No Y = .48, O = .45 ($F_{1, 98}$=2.14)	Gordon & Clark (1974) Cohen (1979)
Low Verbal Young vs Low Verbal Old	Y = 13.3, O = 12.5 ($F_{1, 98}$=2.61, n.s.)	Y = 32, O = 46 ($F_{1, 98}$=59.71, p<.0001) Predicted WAIS: Y = 51, O = 55	Yes Y = .31, O = .25 ($F_{1, 98}$=9.97, p<.002)	Yes Y = .36, O = .31 ($F_{1, 98}$=5.9, p<.02)	Hultsch et al. (Note 1) Taub (1979)-- Average Verbal
Low Verbal Old vs Matching Young	Y = 15.0, O = 12.5 ($F_{1, 98}$=21.91, p<.0001)	Y = 46, O = 46 Predicted WAIS: Y = 59, O = 55	Yes Y = .38, O = .25 ($F_{1, 98}$=42.5, p<.0001)	Yes Y = .41, O = .31 ($F_{1, 98}$=22.9, p<.0001)	Zelinski et al. (1980)

[a]Mean proportion of ideas recalled.

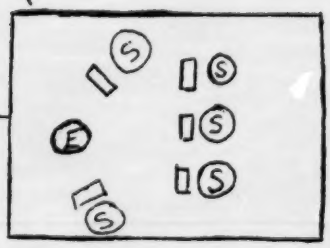
LEARNER VARIABLES

TRADITIONALLY MEASURABLE

Verbal Ability
Education
Age

OTHER (RARELY MEASURED)

World Knowledge
Perspective/Values/Norms
Learning Strategies, Styles, Procedures, etc.



Text Variables

Text Structure
Topic Content
Signaling (explicit emphasis cues)
Cohesion
Number of Levels in Structure
Amount and Type of Details, etc.

Task Variables

Mode of Presentation
Rate of Presentation
Response Mode
Task Requirements--i.e., substantive recall, summarization
Type and setting of task within universe of possibilities

Figure 1. Model for untangling contradictory findings in prose learning with age.

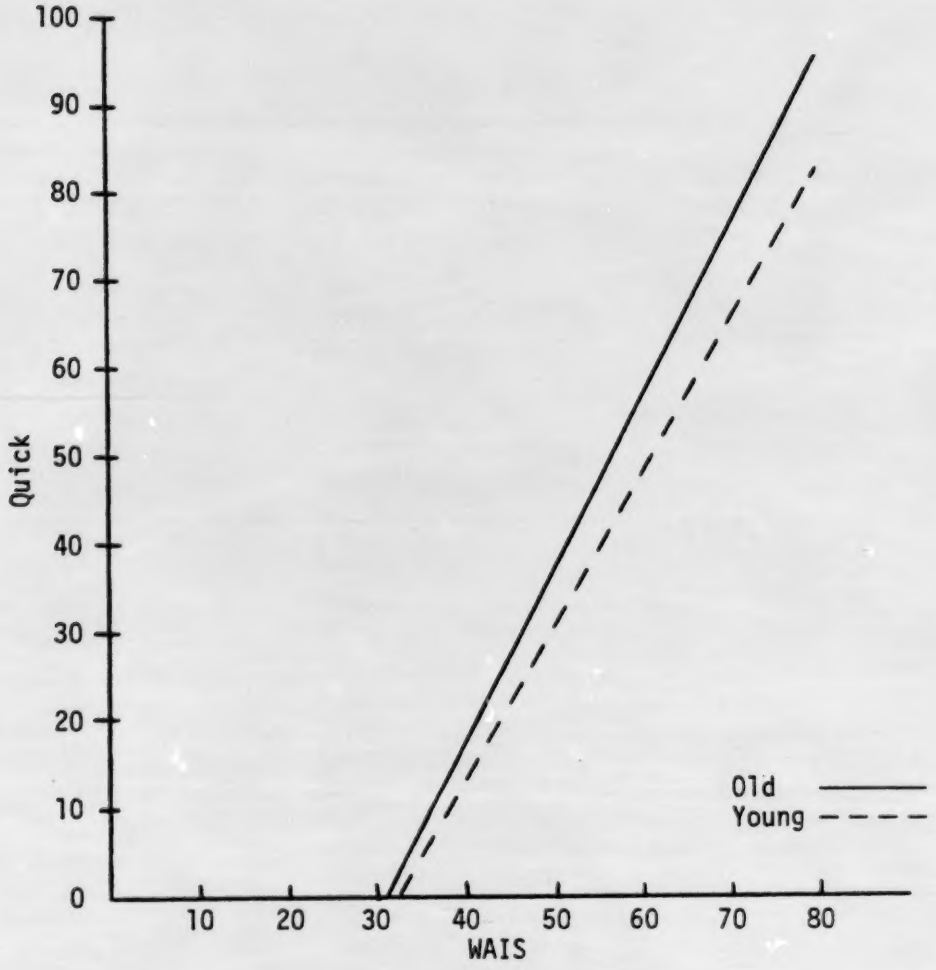


Figure 2. Regression lines between the Vocabulary Subtest of the WAIS and the Quick Word Test for young and old adults.

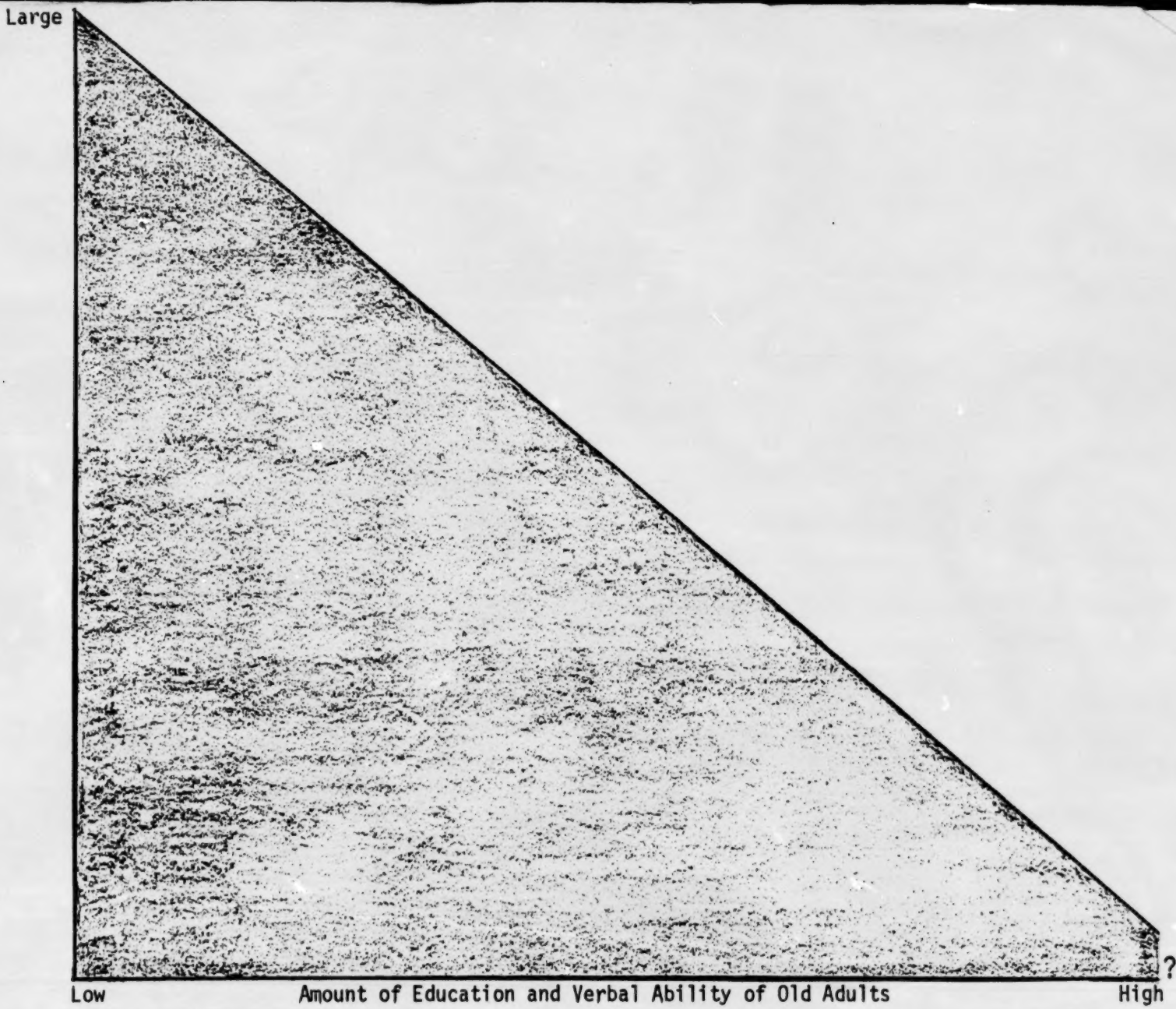


Figure 3. Hypothetical relationship between magnitude of age deficits in prose learning and learner variables of education and verbal ability.